Chapter 1 starts Here

Ch. 1 Matter + Measurment

Chemistry - Study of matter and how it changes.

Matter - Anything that takes up space (volume) and has mass (an amount)

What can you measure?

	SI unit
Length	Meters (m)
Volume	Liters (L)
Mass	Grams (g)

larger units ⟷ smaller units

kilo (k)	hecto (h)	deca (da)	Base	deci (d)	Centi (c)	milli (m)
			Liters (L)			
			Meters (m)			
			grams (g)			

.001 kg .01 hg .1 dag 1 g 10 g 100 g 1000 mg

Setting up a conversion

$15\ km \times \frac{1000\ m}{1\ km}$

1. Multiply number by a fraction
2. Put units in fraction
   - ↳ convert to → top
   - convert from → bottom

$15\ \cancel{km} \times \frac{1000\ m}{\cancel{km}} =$

$15{,}000\ m$

3. Put numbers into coversions
   - ↳ Metric only
     1. Put a 1 in front of bigger unit.
     2. Put a powers of ten base # of columns in front of smaller #

$5mm = \_\_\_\_ hm$

$$5mm \times \frac{1\ hm}{100{,}000\ mm} = 0.00005\ hm$$

Accuracy - how close a measurment is to the real or accepted value.

Precision - how close a series of measurments are to eachother.

Accuracy - % error (calculate) = $\frac{|\text{observed value} - \text{actual value}|}{\text{actual value}} \times 100\%$

Precision - avg. $\pm \frac{\text{Range}}{2}$

5.23
4.85
4.96
5.28
4.91

~~5.05g~~

$5.05g \pm \frac{0.43g}{2}$

$5.05g \pm 0.215g$

Physical Properties - Props of matter observed without change.

Extensive
- Size
- Shape
- length
- mass
- Volume
- texture

Amount Dependant

Intensive (constant)
- Color
- Density
- Melting Point
- Freezing Point
- Boiling Point

Not amount dependent
Substance specific.

$$\text{Density} = D = \frac{M}{V}$$

$$D = \frac{3.14\,g}{10.6\,mL}$$

$$D = 0.296\ \frac{g}{mL}$$

Density of Water = $1\ \frac{g}{mL}$

$$D = \frac{M}{V}$$

$$11.4\ \frac{g}{mL} = \frac{150\,g}{V} \cdot 150$$

~~150 11.4 g/mL~~

$$V = \frac{M}{D}$$

$$V = \frac{150\,g}{11.4\ g/mL}$$

$$V = 13.2\,mL$$

Finding Volume
Water Displacement

$$V_{object} = V_f - V_i$$

Dimension

$$V_{Box} = L \times W \times H$$

$$V_{cylinder} = \pi r^2 h$$